

## WEST BENGAL BOARD CLASS 11 MATHS SAMPLE PAPER

### Mathematics

Class: XI

Total Marks: 80

#### General Instructions:

1. All questions are compulsory.
2. Section A comprises of 10 questions carrying 1 mark each.
3. Section B comprises of 7 questions carrying 2 marks each.
4. Section C comprises of 9 questions carrying 4 marks each.
5. Section D comprises of 4 questions carrying 5 marks each.
6. Use of a calculator is not allowed

SUBJECT: Mathematics

Maximum Marks: 80

Class: XI

#### SECTION-A

A) Multiple choice questions:

10 × 1 = 10

1. Let  $U = \{2,4,5,6,7,8,9,10,11,12\}$   $A = \{5,6,7,8\}$  and  $B = \{9,10,11\}$ . Which equality is correct?

- a)  $A' \cap B' = (A \cup B)'$
- b)  $A' \cup B = (A \cup B)'$
- c)  $A \cap B' = A' \cap B$
- d)  $A \cap B = A' \cup B'$

2. Among the following option which correctly shows remainder when  $(3^{n+3})(3^{2n})$  is divisible by 9?

- a)  $2^{2n}$
- b)  $6^{2n}$
- c)  $3^{2n+1}$
- d)  $9^{2n+2}$

3. If  $x, a, b, c$  are real and  $(x - a + b)^2 + (x - b + c)^2 = 0$ , then  $a, b, c$  is in

- a) H.P
- b) G.P
- c) A.P
- d) A.G.P

4. Out of the given three-digit numbers {100, 101....., 999}. Find the number of numbers whose digits are in descending order.

- a) 120
- b) 720
- c) 84
- d) 504

5. If the equation  $(a_1 - a_2)x + (b_1 - b_2)y = c$  has the perpendicular bisector as the segment joining  $(a_1, b_1), (a_2, b_2)$ , then find  $2c$ .

- a)  $a_1^2 + b_1^2 - a_2^2 - b_2^2$
- b)  $a_1^2 + b_1^2 + a_2^2 + b_2^2$
- c)  $a_1^2 - b_1^2 + a_2^2 - b_2^2$
- d)  $a_1 a^2 + b_1 b^2$

6. Determine standard form of ellipse with foci  $(\pm 2, 0)$  and eccentricity  $1/2$

- a)  $\frac{x^2}{12} + \frac{y^2}{16} = 1$
- b)  $\frac{x^2}{16} + \frac{y^2}{12} = 1$
- c)  $\frac{x^2}{16} + \frac{y^2}{8} = 1$
- d)  $\frac{x^2}{8} + \frac{y^2}{16} = 1$

7. Evaluate:  $\lim_{x \rightarrow 0} \frac{\sqrt{1+x+x^2}-1}{x}$

- a) 0
- b) 1
- c) 2
- d)  $\frac{1}{2}$

8. Evaluate:  $\lim_{n \rightarrow \infty} \frac{5^n - 1}{3^n + 1}$

- a) 0
- b) 1
- c)  $\infty$
- d)  $-\infty$

9. The arithmetic mean of the series  $1, 2, 2^2, \dots, 2^{n-1}$  is

- a)  $\frac{2^n + 1}{n}$
- b)  $\frac{2^n - 1}{n}$
- c)  $\frac{2^n}{n}$
- d)  $\frac{2n}{2^n - 1}$

10. In an experiment of tossing a coin for 'n' times, then probability of having heads an odd number of times is

- a)  $\frac{1}{2^n}$
- b)  $\frac{1}{2}$
- c)  $\frac{1}{3}$
- d)  $\frac{1}{2^{n-1}}$

**SECTION-B**

Answer all the questions. Each question carries 2 marks

**7 × 2 = 14**

11. If  $f(x) = \sqrt{(x^3 - 1)}$  and  $g(x) = \sqrt[3]{x^2 + 1}$ , determine  $f \circ g(x)$  and  $g \circ f(x)$
12. If  $\sin^4 A + \cos^4 A = l + 3 + k \sin^2 A \cdot \cos^2 A$  then determine the value of  $l$  and  $k$ .
13. Solve  $\frac{5}{2} \leq |X + 10| \leq \frac{7}{2}$
14. The sum of a series is 760 and the ratio between the 4<sup>th</sup> and 2<sup>nd</sup> term is  $\frac{5}{3}$ . If first term = 10. Then find the number of terms in the series.
15. With  $(-3, 0, 3)$  as centroid of the triangular park with two of its corners as  $(3, -9, 11); (-2, 5, 7)$ , then determine the third corner.
16. Evaluate  $\lim_{X \rightarrow 3} \frac{X}{3} + \frac{2X+15}{X^2+5X+3}$
17. The runs scored by Virat Kohli in IPL is: 50, 1, 60, 17, 40, 17, 12, 12, 1, 5, 10, 60, 70, 90. Find the median of the runs scored.

**SECTION-C**

Answer all the questions. Each question carries 4 marks.

**9 × 4 = 36**

18. If  $a, b, c$  are values of three-sided triangle, determine the range on number line system  $\frac{ab+bc+ca}{a^2+b^2+c^2}$
19. Prove that  $2 \tan 2A = \frac{2(\sin 2A)}{\cos^2 A - \sin^2 A}$
20. A four-member international committee has been formed by NASA for a project from scientists of three countries as follows: 6 Indians, 3 Europeans, and 4 Americans. Determine the different number of committees can have with at least one scientist from each country.
21. Solve  $(98)^2 + (92)^3 + (99)^4$
22. If the house plot is in the shape of triangle which is represented by coordinate system, its base is  $x + y - 2 = 0$  and the opposite vertex is  $(2, -1)$ . Determine the other two sides of the plot from equation.
23. If a perpendicular chord at point "t" on the curve which is in the shape of parabola  $y^2 = 4ax$ , subtends a right angle at the vertex of given curve, then determine the value of 't'.
24. Find the derivative of  $F(X) = \left(X + \frac{1}{X}\right)^2$
25. Karthik has brought 2 different coloured balls in three bags for his son Arnav. Arnav has to select one of the bags at random and a ball has to be taken. If it is known to be white ball which he has taken, determine the probability that it came from 3<sup>rd</sup> bag, if the composition of balls is as follows, Bag-1: 1 white, 2 black; Bag-2: 2 white, 3 black; Bag-3: 3 white, 2 black.

26. Find the probability

- i) Aman getting more than 60%
- ii) Aman and Ruhi getting more than 80%
- iii) Ruhi getting more than 90%

Name	Test no.				
	1	2	3	4	5
Aman	56	72	69	91	89
Ruhi	71	89	91	65	82

**SECTION-D**

Answer all the questions. Each question carries 5 Marks.

4 x 5 = 20

27. If  $f(A) = \frac{1 - \sin 2A + \cos 2A}{2 \cos 2A}$ , then determine the value of  $8f(11^\circ) \cdot f(34^\circ)$

28. For a positive integer n, show that  $(1 + i)^{2n} + (1 - i)^{2n} = 2^{n+1} \cos\left(n \frac{\pi}{2}\right)$

29. Show that  $C_0 + \frac{3}{2} \cdot C_1 + \frac{9}{2} \cdot C_2 + \frac{27}{4} \cdot C_3 + \dots + \frac{3^n}{n+1} \cdot C_n = \frac{4^{n+1} - 1}{3(n+1)}$

30. If a building is in the shape of a tetrahedron with its vertex is at origin and its other three edges are represented by position vectors in 3-dimensional system as given by  $\overrightarrow{OP} = 2\hat{i} - \hat{j} + 3\hat{k}$ ,  $\overrightarrow{OQ} = \hat{i} + \hat{j} - 2\hat{k}$ ,  $\overrightarrow{OR} = 3\hat{i} + 4\hat{j} + \hat{k}$ , then determine the angle between two sides of the building OPQ and PQR.

